Extracorporeal Bypass Use Improves Outcomes of Open Thoracic and Thoracoabdominal Aneurysm Repair

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Objectives: There is no consensus on the use or benefit of extracorporeal circulation (EC) during descending thoracic (DTA) or thoracoabdominal aneurysm (TAA) repair. We evaluated the role of EC during DTA or TAA repair using U.S. Medicare data.

Methods: Medicare (2004-2007) patients undergoing intact open DTA or TAA repair were identified by ICD-9 code; specific exclusions included ascending/arch and hypothermic circulatory arrest (DHCA) operations. The impact of EC (ICD-9 39.61) on early and late outcomes was analyzed using standard statistical methods.

Results: A total of 4230 patients had DTA or TAA repair, with EC used in 2433 (57%). Differences in baseline clinical features are presented in the Table. The 30-day mortality, any complication, and systemic complications were significantly reduced with EC use (Table). EC patients had shorter length of stay of 13.5 ± 13 vs 17.2 ± 18 days ($P < .01$) and lower total hospital charges of $151,000 ± $140,000 vs $180,000 ± $190,000 ($P < .01$). EC patients were more likely to be discharged home than to an extended care facility (67% vs 56%; $P < .01$). Multivariable regression modeling (odds ratio [95% confidence interval] to adjust for baseline clinical differences showed EC to independently reduce operative mortality (0.80 [0.65-0.97]; $P = .02$), any complication (0.67 [0.59-0.76]; $P < .01$), pulmonary complications (0.68 [0.59-0.79]; $P < .01$), and acute renal failure (0.52; [0.44-0.61]; $P < .01$). Long-term survival was higher (log-rank $P < .01$) in EC patients at 1 year (81% ± 0.8% vs 73% ± 1%) and 5 years (67% ± 1% vs 52% ± 1%). Risk-adjusted Cox proportional hazards regression also showed that EC was independently associated with improved long-term survival (odds ratio, 0.69; 95% confidence interval, 0.63-0.74; $P < .01$).

Conclusions: Although important clinical variables such as DTA/TAA extent and spinal cord ischemic complications cannot be assessed with the Medicare database, EC used during open DTA and TAA repair significantly reduces operative mortality, morbidity, and procedural costs, and improves late survival. These data indicate EC should be a more widely applied adjunct in DTA/TAA open surgery.

Table. Univariate differences in clinical features and outcomes after DTA/TAA repair

Variable	*Extracorporeal bypass (n = 2433)*	*No bypass (clamp/sew) (n = 1797)*	P
Clinical features			
Age, years	73 ± 7.6	71.7 ± 8	<.01
Female sex	52%	48%	<.01
CAD	23%	24%	.7
COPD	28%	34%	<.01
PVD	5.7%	11.3%	<.01
CKD	5.5%	7.7%	<.01
Outcomes			
30-day mortality	9.7%	12.2%	<.01
Complications			
Any	49%	58%	<.01
Cardiac	14%	13%	.16
Pulmonary	21%	27%	<.01
Acute renal failure	14%	24%	<.01
Bleeding	13%	19%	<.01
Infectious	5.9%	7.7%	<.01

CAD, Coronary artery disease; *CKD,* chronic kidney disease; *COPD,* chronic obstructive pulmonary disease; *PVD,* peripheral vascular disease.

Iliac Artery Exposure Independently Predicts Mortality in Female Patients Undergoing Thoracic Endovascular Aortic Aneurysm Repair (TEVAR): An Analysis of the ACS-NSQIP Database

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Objectives: Previous studies have shown that female gender is associated with increased morbidity and mortality after endovascular abdominal aortic aneurysm repair. The goal of this study was to assess the effect of gender on the 30-day outcomes of thoracic endovascular aortic aneurysm repair (TEVAR) using the American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP) database.

Methods: This was a review of the 2005 to 2010 ACS-NSQIP database to identify all patients who underwent TEVAR for nonruptured thoracic aortic aneurysm. Procedure and diagnosis codes were used to capture the study population. Patients were stratified according to gender. Baseline, operative, and outcomes data were compared in bivariate fashion. The 30-day mortality was the primary outcome measure, and a multivariable logistic regression model was used to identify independent associations.

Results: During the study period, 649 patients, comprising 279 women (43%) and 370 men (57%), underwent TEVAR. Baseline demographics according to gender were similar; however, women were less likely to drink alcohol (1% vs 5%; $P = .001$) and to have a history of cardiac surgery (14% vs 27%; $P < .001$). More women required iliac artery exposure (18% vs 7%; $P \leq .001$). Women had increased operative times (173.6 ± 6.3 vs 159.8 ± 5.2 minutes; $P = .03$), transfusion rates (30% vs 17%, $P = .001$), and hospital length of stay (7.7 ± 0.5 vs 7.6 ± 0.5 days; $P = .009$) compared with men. Overall postoperative complications were similar, but unadjusted mortality was significantly greater in women (6% vs 3%; $P = .03$). On multivariable analysis (odds ratio [95% confidence interval], female gender was no longer a significant predictor of mortality (2.30 [0.99-5.34]; $P = .053$), but independent predictors of 30-day mortality included increasing age (1.05 [1.01-1.09]; $P = .02$), emergency procedure (3.76 [1.79-7.87]; $P < .001$), and iliac artery exposure (4.42 [2.07-9.44]; $P < .001$).

Conclusions: The 30-day mortality is increased in women compared with men. This seems to be explained by an increased need for iliac artery exposure that results in increased operative times, transfusion rates, and 30-day mortality after TEVAR for unruptured thoracic aortic aneurysms. These findings represent a strong need for decreased device delivery size and improvements in endovascular technology.

Outcomes of Lower Extremity Bypass Performed for Acute Limb Ischemia

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Objectives: Acute limb ischemia (ALI) remains one of the most challenging emergencies in vascular surgery. Historically, outcomes after interventions for ALI have been associated with high rates of morbidity and mortality. The purpose of this study was to determine contemporary outcomes after lower extremity bypass (LEB) performed for ALI.

Methods: All patients undergoing infrainguinal LEB between 2003 and 2011 within hospitals comprising the Vascular Study Group of New England (VSGNE) were identified. Patients were stratified according to whether the indication for LEB was ALI. Primary end points included bypass graft occlusion, major amputation, and mortality at 1 year postoperatively as determined by Kaplan-Meier life-table analyses. Multivariable Cox proportional hazards models were constructed to evaluate independent predictors of mortality and major amputation at 1 year.

Results: Of 5712 LEB procedures, 323 (5.7%) were performed for ALI. Patients undergoing LEB for ALI were similar in age (66 vs 67 years; $P = .084$) and gender (68% male vs 69% female; $P = .617$), but were less likely to be taking aspirin (63% vs 75%, $P < .0001$) or a statin (55% vs 68%; $P < .0001$). Patients with ALI were more likely to be current smokers (49% vs 39%; $P < .0001$), and to have had a prior ipsilateral bypass (33% vs 24%; $P = .004$) or a prior ipsilateral percutaneous intervention (41% vs 29%, $P = .001$). Bypasses performed for ALI were longer in duration (270 vs 244 minutes; $P < .0001$), had greater blood loss (363 vs 272 mL; $P < .0001$), and more commonly used prosthetic conduits (41% vs 33%; $P = .003$). ALI patients experienced increased in-hospital major adverse events, including myocardial infarction, congestive heart failure, deterioration in renal function, and respiratory complications (Table). Patients who underwent LEB for ALI had no difference in rates of graft occlusion, but did have significantly higher rates of limb loss and mortality at 1 year (Table). On multivariate analysis, ALI was an independent predictor of major amputation (HR, 2.16; CI, 1.38-3.40; $P = .001$) and mortality (HR, 1.41; CI, 1.09-1.83; $P = .009$) at 1 year.

Conclusions: Patients who present with ALI represent a less medically optimized subgroup within the population of patients undergoing LEB.